

What is claimed is:

1. A portable beverage dispensing system comprising:
 - (a) a supply of flat water;
 - (b) a supply of pressurized gaseous carbon dioxide;
 - 5 (c) a first motorless carbonator configured to receive a portion of the flat water and a portion of the carbon dioxide and to cause a portion of the carbon dioxide to dissolve in the flat water to produce partially carbonated soda;
 - (d) a second motorless carbonator configured to receive a portion of the partially carbonated soda and a portion of the carbon dioxide and to cause a portion of the carbon
 - 10 dioxide to dissolve in the partially carbonated soda and to produce fully carbonated soda; and
 - (e) a dispenser for selectively dispensing the fully carbonated soda.
2. A portable beverage dispensing system according to claim 1 wherein the flat water is supplied to the first motorless carbonator at about 90 psi to about 110 psi.
- 15 3. A portable beverage dispensing system according to claim 2 wherein the flat water is supplied to the first motorless carbonator at about 100 psi.
4. A portable beverage dispensing system according to claim 1 wherein the carbon
- 20 dioxide is supplied to the first and second motorless carbonators at about 90 psi to about 110 psi.
5. A portable beverage dispensing system according to claim 4 wherein the carbon dioxide is supplied to the first and second motorless carbonators at about 100 psi.

6. A portable beverage dispensing system according to claim 1 wherein the partially carbonated soda has about 2.4 percent to about 3.6 percent carbonation.
7. A portable beverage dispensing system according to claim 6 wherein the fully carbonated soda has about 3.6 percent to about 4.2 percent carbonation.
8. A portable beverage dispensing system according to claim 1 and further including an ice-chilled cold plate, and wherein the portion of flat water received by the first carbonator is chilled by the cold plate before the flat water is received by the first carbonator.
9. A portable beverage dispensing system according to claim 8 wherein the portion of flat water received by the first carbonator is chilled by the cold plate to a temperature less than about 40 degrees Fahrenheit.
10. A portable beverage dispensing system according to claim 8 wherein the portion of flat water received by the first carbonator is chilled by the cold plate to a temperature of about 33 degrees Fahrenheit.
11. A portable beverage dispensing system according to claim 1 wherein the supply of gaseous carbon dioxide comprises a disposable, non-refillable cylinder having a throat and a plug with a piercable membrane affixed in the throat.
12. A portable beverage dispensing system according to claim 11 wherein the cylinder is configured to safely store carbon dioxide at least at about 1800 psi.

13. A portable beverage dispensing system according to claim 11 wherein the cylinder conforms to the requirements of 49 CFR 178.46.

5 14. A portable beverage dispensing system according to claim 11 wherein the cylinder has a liquid capacity of about 68 fluid ounces.

15. A portable beverage dispensing system according to claim 11 and further comprising a gas supply valve having a stem configured for selectively piercing the membrane.

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16. A portable beverage dispensing system according to claim 1 and further comprising at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flat water to pass from the water supply to the first carbonator.

15 17. A portable beverage dispensing system according to claim 1 and further comprising a flavored syrup supply and at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flavored syrup to pass from the syrup supply to the dispenser, and wherein the dispenser mixes syrup with the fully carbonated soda in a desired proportion.

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18. A portable beverage dispensing system comprising:

(a) a supply of flat water;

(b) a high pressure cylinder containing pressurized carbon dioxide and including a neck having a throat and a selectively piercable membrane sealing the throat;

(b) at least one motorless carbonator configured to receive a portion of the flat water and a portion of the carbon dioxide and to cause a portion of the carbon dioxide to dissolve in the flat water to produce carbonated soda; and

5 (c) a dispenser for selectively dispensing carbonated soda.

19. A portable beverage dispensing system according to claim 18 and comprising;

(a) a first motorless carbonator configured to receive a portion of the flat water and a portion of the carbon dioxide and to cause a portion of the carbon dioxide to dissolve

10 in the flat water to produce partially carbonated soda;

(d) a second motorless carbonator configured to receive a portion of the partially carbonated soda and a portion of the carbon dioxide and to cause a portion of the carbon dioxide to dissolve in the partially carbonated soda and to produce fully carbonated soda.

15 20. A portable beverage dispensing system according to claim 18 wherein the flat water is supplied to the carbonator at about 90 psi to about 110 psi.

21. A portable beverage dispensing system according to claim 20 wherein the flat water is supplied to the first motorless carbonator at about 100 psi.

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22. A portable beverage dispensing system according to claim 18 wherein the carbon dioxide is supplied to the carbonator at about 90 psi to about 110 psi.

23. A portable beverage dispensing system according to claim 22 wherein the carbon dioxide is supplied to the carbonator at about 100 psi.

24. A portable beverage dispensing system according to claim 18 wherein the carbonated
5 soda has about 2.4 percent to about 4.2 percent carbonation.

25. A portable beverage dispensing system according to claim 18 and further including an ice-chilled cold plate, and wherein the portion of flat water received by the carbonator is chilled by the cold plate before the flat water is received by the carbonator.

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26. A portable beverage dispensing system according to claim 25 wherein the portion of flat water received by the carbonator is chilled by the cold plate to a temperature less than about 40 degrees Fahrenheit.

15 27. A portable beverage dispensing system according to claim 25 wherein the portion of flat water received by the carbonator is chilled by the cold plate to a temperature of about 33 degrees Fahrenheit.

28. A portable beverage dispensing system according to claim 18 wherein the cylinder is
20 configured to safely store carbon dioxide at least at about 1800 psi.

29. A portable beverage dispensing system according to claim 18 wherein the cylinder conforms to the requirements of 49 CFR 178.46.

30. A portable beverage dispensing system according to claim 18 wherein the cylinder has a liquid capacity of about 68 fluid ounces.

31. A portable beverage dispensing system according to claim 18 and further comprising
5 a gas supply valve having a stem configured for selectively piercing the membrane.

32. A portable beverage dispensing system according to claim 18 and further comprising at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flat water to pass from the water supply to the carbonator.

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33. A portable beverage dispensing system according to claim 18 and further comprising a flavored syrup supply and at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flavored syrup to pass from the syrup supply to the dispenser, and wherein the dispenser mixes syrup with the carbonated soda in a desired
15 proportion.

34. A portable beverage dispensing module, the module comprising:

(a) a housing;

(b) a supply of pressurized gaseous carbon dioxide;

20 (c) a first motorless carbonator in the housing, the first carbonator being configured to receive flat water from a flat water supply and to receive a portion of the carbon dioxide, and to cause a portion of the carbon dioxide to dissolve in the flat water to produce partially carbonated soda;

(d) a second motorless carbonator in the housing, the second carbonator being configured to receive the partially carbonated soda and a portion of the carbon dioxide and to cause a portion of the carbon dioxide to dissolve in the partially carbonated soda and to produce fully carbonated soda; and

5 (e) a dispenser for selectively dispensing the fully carbonated soda.

35. A portable beverage dispensing module according to claim 34 wherein the carbon dioxide is supplied to the first and second motorless carbonators at about 90 psi to about 110 psi.

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36. A portable beverage dispensing module according to claim 34 wherein the carbon dioxide is supplied to the first and second motorless carbonators at about 100 psi.

15 37. A portable beverage dispensing module according to claim 34 wherein the partially carbonated soda has about 2.4 percent to about 3.6 percent carbonation.

38. A portable beverage dispensing module according to claim 34 wherein the fully carbonated soda has about 3.6 percent to about 4.2 percent carbonation.

20 39. A portable beverage dispensing module according to claim 34 and further including an ice-chilled cold plate, and wherein the portion of flat water received by the first carbonator is chilled by the cold plate before the flat water is received by the first carbonator.

40. A portable beverage dispensing module according to claim 39 wherein the portion of flat water received by the first carbonator is chilled by the cold plate to a temperature less than about 40 degrees Fahrenheit.

5 41. A portable beverage dispensing module according to claim 39 wherein the portion of flat water received by the first carbonator is chilled by the cold plate to a temperature of about 33 degrees Fahrenheit.

42. A portable beverage dispensing module according to claim 34 wherein the supply of
10 pressurized gaseous carbon dioxide is a cylinder including a throat and a plug having a piercable membrane, the plug being affixed in the throat.

43. A portable beverage dispensing module according to claim 42 wherein the cylinder is configured to safely store carbon dioxide at least at about 1800 psi.

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44. A portable beverage dispensing module according to claim 42 wherein the cylinder conforms to the requirements of 49 CFR 178.46.

45. A portable beverage dispensing system according to claim 42 wherein the cylinder
20 has a liquid capacity of about 68 fluid ounces.

46. A portable beverage dispensing module according to claim 42 and further comprising a gas supply valve having a stem configured to selectively pierce the membrane.

47. A portable beverage dispensing module according to claim 34 and further comprising at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flavored syrup to pass from a syrup supply to the dispenser, and wherein the dispenser mixes syrup with the fully carbonated soda in a desired proportion.

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48. A portable beverage dispensing module, the module comprising:

(a) a housing;

(b) a high pressure cylinder in the housing, the cylinder containing pressurized carbon dioxide and including a neck having a throat and a selectively piercable membrane sealing the throat;

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(c) at least one motorless carbonator in the housing, the carbonator being configured to receive flat water from a flat water supply and a portion of the carbon dioxide and to cause a portion of the carbon dioxide to dissolve in the flat water to produce carbonated soda; and

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(e) a dispenser for selectively dispensing the carbonated soda.

49. A portable beverage dispensing module according to claim 48, the module comprising:

(a) a first motorless carbonator in the housing, the first carbonator being

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configured to receive flat water from a flat water supply and to receive a portion of the carbon dioxide, and to cause a portion of the carbon dioxide to dissolve in the flat water to produce partially carbonated soda; and

(b) a second motorless carbonator in the housing, the second carbonator being configured to receive the partially carbonated soda and a portion of the carbon dioxide and to

cause a portion of the carbon dioxide to dissolve in the partially carbonated soda and to produce fully carbonated soda; and

(c) a dispenser for selectively dispensing the fully carbonated soda.

5 50. A portable beverage dispensing module according to claim 48 wherein the flat water is supplied to the carbonator at about 90 psi to about 110 psi.

51. A portable beverage dispensing module according to claim 48 wherein the flat water is supplied to the carbonator at about 100 psi.

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52. A portable beverage dispensing module according to claim 48 wherein the carbon dioxide is supplied to the carbonator at about 90 psi to about 110 psi.

15 53. A portable beverage dispensing module according to claim 48 wherein the carbon dioxide is supplied to the carbonator at about 100 psi.

54. A portable beverage dispensing module according to claim 48 wherein the carbonated soda has about 2.4 percent to about 4.2 percent carbonation.

20 55. A portable beverage dispensing module according to claim 48 and further including an ice-chilled cold plate, and wherein the flat water received by the carbonator is chilled by the cold plate before the flat water is received by the carbonator.

56. A portable beverage dispensing module according to claim 48 wherein the flat water received by the carbonator is chilled by the cold plate to a temperature less than about 40 degrees Fahrenheit.

5 57. A portable beverage dispensing module according to claim 48 wherein the flat water received by the carbonator is chilled by the cold plate to a temperature of about 33 degrees Fahrenheit.

58. A portable beverage dispensing module according to claim 48 wherein the cylinder is
10 configured to safely store carbon dioxide at least at about 1800 psi.

59. A portable beverage dispensing module according to claim 48 wherein the cylinder conforms to the requirements of 49 CFR 178.46.

15 60. A portable beverage dispensing module according to claim 48 wherein the cylinder has a liquid capacity of about 68 fluid ounces.

61. A portable beverage dispensing module according to claim 48 and further comprising a gas supply valve having a stem configured for selectively piercing the membrane.

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62. A portable beverage dispensing module according to claim 48 and further comprising at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flat water to pass from a water supply to the carbonator.

63. A portable beverage dispensing module according to claim 48 and further comprising a flavored syrup supply and at least one pneumatic pump powered by the pressurized carbon dioxide, the pump being configured to cause flavored syrup to pass from the syrup supply to the dispenser, and wherein the dispenser mixes syrup with the carbonated soda in a desired proportion.

64. A high pressure gas cylinder comprising:
(a) a neck having a throat; and
(b) a piercable membrane sealing the throat.

65. A high pressure gas cylinder according to claim 64 wherein the cylinder is configured to safely store carbon dioxide at least at about 1800 psi.

66. A high pressure gas cylinder according to claim 64 wherein the cylinder conforms to the requirements of 49 CFR 178.46.

67. A high pressure gas cylinder according to claim 64 wherein the cylinder has a liquid capacity of about 68 fluid ounces.

68. A high pressure gas cylinder according to claim 64 wherein the cylinder is seamless and is constructed of aluminum.

69. A high pressure gas cylinder according to claim 64 and further comprising a gas supply valve having a movable stem configured to selectively pierce the membrane.

70. A two-stage motorless high-pressure carbonator for a beverage dispensing system comprising:

(a) a first carbonation chamber having a flat water inlet, a first carbon dioxide inlet, and a first soda outlet;

(b) a second carbonation chamber having a soda inlet, a second carbon dioxide inlet, and a second soda outlet; and

(c) a conduit connecting the first soda outlet of the first carbonation chamber to the soda inlet of the second carbonation chamber;

(d) wherein partially carbonated soda from the first carbonation chamber is passed to the second carbonation chamber through the conduit and is further carbonated in the second carbonation chamber.

71. A two-stage motorless high pressure carbonator according to claim 70 wherein the first carbonation chamber is in a first housing, and the second carbonation chamber is in a second housing.

72. A two-stage motorless high pressure carbonator according to claim 70 wherein the first and second housings are affixed together.

73. A two-stage motorless high pressure carbonator according to claim 70 wherein the first and second carbonation chambers are each capable of operating at an internal pressure of at least about 100 psi.

74. A two-stage motorless high pressure carbonator according to claim 70 wherein the first stage carbonator is capable of producing partially carbonated soda having a carbonation percentage of at least about 2.4 percent.

5 75. A two-stage motorless high pressure carbonator according to claim 74 wherein the second stage carbonator is capable of producing fully carbonated soda having a carbonation percentage of at least about 3.6 percent.

76. A two-stage motorless carbonator according to claim 70 wherein the first stage
10 carbonator is capable of producing partially carbonated soda at a rate of at least about 1.5 fluid ounces per second.

77. A two-stage motorless carbonator according to claim 70 wherein the second stage
15 carbonator is capable of producing fully carbonated soda at a rate of at least about 1.5 fluid ounces per second.